DUGWAY PERMIT

MODULE VII

ATTACHMENT 17

SWMU 056
POST-CLOSURE PLAN

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

bgs	below ground surface
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation
CMIR	Corrective Measures Implementation Report
CWM	Chemical Warfare Materiel
DPG	Dugway Proving Ground
DSHW	Divisions of Solid and Hazardous Waste
ft	feet
GCL	Geosynthetic Clay Liner
LUTP	Land Use Tracking Plan
mg/L	milligrams per liter
msl	mean sea level
OE	Ordnance and Explosive
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RFA	RCRA Facility Assessment
Shaw	Shaw Environmental, Inc.
SWMU	Solid Waste Management Unit
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
USGS	U.S Geological Survey
UXO	Unexploded Ordnance

1.0 INTRODUCTION

The objective of this Post-Closure Plan is to ensure that Dugway Proving Grounds (DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with 40 Code of Federal Regulations (CFR) 264.117, with respect to post-closure inspection requirements. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Units (SWMUs) 056A and 056B, herein referred to as DPG-056A and DPG-056B, and collectively referred to as DPG-056. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-056. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR 264.117(a)(2)).

In accordance with Title 40 CFR 270.28 and Utah Administrative Code (UAC) R315-3-2.19, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-056, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR 270.14(b)(1) UAC R315-3-2.5(b)(1)	General Description of the Facility	Section 2.0
40 CFR 270.14(b)(4) UAC R315-3-2.5(b)(4)	Description of Security Procedures	Section 3.0
40 CFR 270.14(b)(5) UAC R315-3-2.5(b)(5)	General Inspection Schedule	Section 6.0 and Appendix B
40 CFR 270.14(b)(6) UAC R315-3-2.5(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR 270.14(b)(11)(i-ii, v) UAC R315-3-2.5(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR 270.14(b)(11) (iii-v) UAC R315-3-2.5(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40CFR 270.14(b)(13) UAC R315-3-2.5(b)(13)	Copy of the Closure Proposal	Phase II RCRA (Resource Conservation and Recovery Act) Facility Investigations (RFIs) were approved on 10/04/2005 (DPG-056A) and 09/29/2005 (DPG-056B). No public comments were received.
40 CFR 270.14(b)(14) UAC R315-3-2.5(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR 270.14(b)(16) UAC R315-3-2.5(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR 270.14(b)(18) UAC R315-3-2.5(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-056 is not located within a verified 100-year floodplain area.
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (iv)	Topographic Map Surrounding land uses	DPG-056 is within a military base. There are no nearby operations in the vicinity of DPG-056.
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing wind speed and direction)	There are no residential populations abutting DPG-056. The closest residential area is English Village (approximately 4.4 miles away). A wind rose is not deemed necessary for DPG-056.

Table 1 (Continued): Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR 270.14(b)(19) UAC R315-3-2.5(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figures 3A and 3B. DPG-056 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR 270.14(c) UAC R315-3-2.5(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.
40 CFR 270.14(c) UAC R315-3-2.5(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR 270.14(c) UAC R315-3-2.5(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2
40 CFR 270.14(c) UAC R315-3-2.5(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.
40 CFR 270.14(c) UAC R315-3-2.5(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-056 is not required.
40 CFR 270.14(c) UAC R315-3-2.5(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-056 is not required.

Table 1 (Continued): Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR 270.14(c) UAC R315-3-2.5(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-056 is not required.
40 CFR 270.14(c) UAC R315-3-2.5(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-056 is not required.
40 CFR 270.14(c) UAC R315-3-2.5(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-056 is not required.

CFR = Code of Federal Regulations
DPG = Dugway Proving Grounds
RCRA = Resource Conservation and Recovery Act
RFIs = RCRA Facility Investigations
UAC = Utah Administrative Code

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-056, as required by UAC R315-3-2.5(b)(1) (Figures 1 and 2).

2.1 DPG-056 LOCATION AND HISTORY

DPG-056 consists of two subsites (DPG-056A and DPG-056B) separated by 0.3 miles along an unnamed dirt road east of the Carr Facility. DPG-056A, the eastern most subsite, consisted of eight detonation craters and a single buried waste cell partially covered by a soil mound. DPG-056B consisted of a single waste cell covered by a soil mound. The locations of each subsite are shown in Figures 1 and 2. A detailed description of each subsite follows.

DPG-056A

DPG-056A was an abandoned disposal area located 1.7 miles east of the Carr Facility on an unnamed dirt road (Figures 1 and 2). This site occupied an area of approximately 5.6 acres and was composed of eight detonation craters (DC-1 through DC-8), and one soil mound (MD-1) covering an associated trench (TR-1) that contains buried waste. The topography of this site is relatively flat with an average elevation of 4,380 ft above mean sea level (msl), and slopes gently to the west.

DPG-056B

DPG-056B was a former landfill located 1.4 miles east of the Carr Facility on an unnamed dirt road (Figures 1 and 2). This site occupied an area of approximately 1.6 acres and was composed of one well-defined soil mound (MD-1) overlying buried waste. The area surrounding MD-1 covered a total affected area (the portion of the site where soil was potentially disturbed or otherwise affected by site activities) of approximately 0.2 acre. The topography of this site is relatively flat with an average elevation of 4,375 ft above msl, and slopes gently to the west.

2.2 PAST OPERATIONS

DPG-056A

Past activities at DPG-056A are believed to be related to the detonation and disposal operations of conventional and chemical munitions (Parsons, 1999). The RCRA Facility Assessment (RFA) states that this disposal area was used to dispose of munitions during the 1970s (Utah Department of Environmental Quality [UDEQ], 1992). Earlier reports indicate that chemical munitions were used extensively in the area (DPG Environmental and Life Sciences Division, 1982). Additionally, DPG-056A is located in a former projectile firing range; therefore, scattered ordnance and explosive (OE) remnants and potentially unexploded ordnance (UXO) remained on the ground surface, and may be present in the shallow subsurface underlying detonation craters at this site. Surface debris composed of empty propellant charge cans, expended 105 mm cartridge cases, M55 tube end caps, and other miscellaneous debris were removed from the site prior to Phase I activities; however, additional site history is unknown, including details regarding disposal dates and activities.

Debris removed from the site suggests that M55 rockets were present at DPG-056A. In addition to explosives, chemical agents, and propellants, M55 rockets contained small amounts (less than 20 grams) of potassium perchlorate. Perchlorate was a minor component (less than one percent of the filling material relative to propellant and high explosive).

DPG-056B

Previous activities at DPG-056B are believed to be related to past disposal practices, range cleanup, and grading activities (Parsons, 2005). The surface of the mound was littered with illumination flare remnants. Abundant buried debris was observed during test pit activities, suggesting that the mound covered an old burial pit. These field observations were supported by geophysical survey results indicating that buried waste was present beneath MD-1 (Appendix F of the Corrective Measures Implementation [CMI] Plan – Shaw Environmental, Inc. [Shaw], 2006a). Additional site history is unknown, including details regarding test operation dates, disposal, and other site activities. However, aerial photo analysis shows that disturbed ground and a linear feature appear at the site between 1953 and 1960.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-056 in the Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (UAC R315-3-2.5(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-056 Investigations

Document Title	Received Date	DSHW Library No.
Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	
Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Revision 2, Parsons Engineering Science, Denver, Colorado.* May	05/02	
Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-56 Addendum.* June.	06/04	
Parsons, 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-56B Addendum*. June.	06/05	
Shaw Environmental Inc. (Shaw), 2006a. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	
Shaw Environmental, Inc., 2006b. *Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	
Shaw Environmental, Inc., 2007. *Final Corrective Measures Implementation Report for DPG-056*.	03/07	

2.4 CLOSURE ACTIVITIES

In accordance with UAC R315-7-21 and the CMI Plan (Shaw, 2006a), closure at DPG-056 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches and backfilling of detonation craters graded for drainage. The closure activities are described in the Final Corrective Measures Implementation Report (CMIR) (Shaw, 2007). Appendix A includes a copy of the DPG-056 Closure Certification.

The final cover systems, as designed and constructed, satisfy the requirements of UAC R315-7-14 and R315-7-21 (by reference 40 CFR 264, Subpart N, 264.310) for the closure and post-closure of DPG-056, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-056 included:

- Installation of the final engineered cover system;
- Filling of detonation craters with clean borrow soil; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. An inspection checklist designed to insure that these objectives are maintained is presented in Appendix B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted according to the Risk Assumptions Document (Parsons, 2002) and indicated that no subsurface contamination was detected in soil outside of the areas to be covered. Groundwater at DPG-056A is not impacted and does not pose an unacceptable risk as defined in UAC R315-101. Future impacts to groundwater at DPG-056B are not expected based on the results of soil-to-groundwater analysis. The risk assessment focused on areas outside the constructed cover, but did take into consideration airborne particulates emanating from the landfill surface prior to remediation. Direct sampling of the contents of the waste underlying the mounds present at each subsite could not be conducted due to the potential presence of UXO, chemical warfare materiel (CWM), and/or other OE debris. Despite the absence of direct sampling results, risks to intrusive site workers and burrowing ecological receptors associated with uncharacterized buried wastes are assumed to be unacceptable based on the types of materials potentially present. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than 1.0. Ecological risks are expected to be minimal. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided. The final RFIs (Parsons, 2004 and 2005), contained in Appendix B of the CMI Plan (Shaw, 2006a), include the full results of both the human health and ecological risk assessments for DPG-056.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-056. The general direction of surface water drainage in the area surrounding these units is to the west, toward the main portion of the Great Salt Lake Desert. Government Creek, an ephemeral stream, is located approximately one mile from DPG-056.

No monitoring wells are located at DPG-056A. Based on the investigation at DPG-056B, the following discussion is presented for both subsites. Groundwater is first encountered at approximately 51 ft below ground surface (bgs). Monitoring well and hydropunch sampling indicates that shallow groundwater quality ranges between Class II (drinking water) and Class III (limited use) per UAC R317-6-3 (DWQ, 2002), with total dissolved solids at the site ranging from 880 to 3465 milligrams per liter (mg/L), averaging 1604 mg/L. The nearest source of potable groundwater is at water well WW-5 located inside the Carr Facility (Figure 2). Well WW-5 is screened in the deep aquifer under confined conditions at a depth of 325-355 ft bgs. No contamination has been identified in groundwater sampled from well WW-5. The confining clay layer that separates the shallow water-bearing zone and the deep potable aquifer is thinner in the vicinity of DPG-056 compared to other sites closer to the Carr Facility due to the observed pattern of clay thickening basinward; however, these units do not appear to be hydraulically connected in the vicinity of DPG-056B based on an 18-22 ft thick clay confining layer (Parsons, 2005).

Water well WW-33 was drilled in May 2003 west of the Carr Facility and is located approximately 2.3 miles west of DPG-056B. Well WW-33 is also screened in the confined deep aquifer from 290 to 390 ft bgs. No contamination has been identified in groundwater sampled from well WW-33 (Kleinfelder, 2003).

DPG is in the process of developing a Carr Groundwater Management Area approach to ensure continuity of monitoring requirements across all sites in the vicinity of the Carr Facility. Based on guidance provided by UDEQ, long-term monitoring requirements at DPG-056 are expected to be very limited.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by 40 CFR 264.116 and 264.119, which are incorporated by reference in UAC R315-8-7. Dugway's Post-Closure Land Use Tracking Plan (LUTP) shall be used to monitor land use as required per Permit in Condition VII.H.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-056:

1. DPG-056 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-056, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspections is listed on the Post-Closure Inspection schedule. Dugway shall report to the DSHW any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-056.

4. Damaged or missing security facilities shall be noted in the general site inspection checklist which is included as Appendix B of this report. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-056 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2006a). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial Post-Closure Report shall be required. As specified in Section 2.7, Dugway's LUTP shall be used to monitor land use at DPG-056. Removal and reuse of soil from this site will not be allowed except as described in the LUTP. Until such time as the LUTP is approved, no soil shall be excavated or removed from this site.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period general inspections of the former DPG-056 site shall be conducted semi-annually to ensure that the integrity of the engineered cap is maintained. The frequency of inspections can be scaled back to once per year once conditions of the landfill cap have stabilized over a minimum period of two years. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. Appendix B includes a general site inspection checklist. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the soil covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- No weeds or trees (with deep tap roots) are present that may penetrate the cap;
- Signs are in good condition;

- Drainage patterns and roads are functioning as planned with no significant erosion or ponding; and
- The survey monuments are undamaged and there is no significant subsidence of the landfill cap.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected during each inspection for the first two years and analyzed for salinity as a contingency in case additional erosion control measures are necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figures 3A and 3B) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument locations and elevations will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-056A and DPG-056B survey monuments (SM056A and SM056B) have been summarized in Tables 3A and 3B, respectively. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figures 3A and 3B, are presented for future reference.

Table 3A: DPG-056A Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM056A)	7,231,396	1,259,830	4,367.0
7000	7,231,643	1,261,693	4,365.9
7001	7,231,642	1,261,615	4,366.3
7002	7,231,765	1,261,615	4,365.7
7003	7,231,764	1,261,693	4,365.8

[a] *The locations and elevations represent design coordinates. The final elevations will be recorded with the initial baseline survey.*
ft = feet
msl = mean seal level

Table 3B: DPG-056B Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM056B)	7,231,710	1,261,652	4,367.5
7000	7,231,374	1,259,846	4,367.0
7001	7,231,370	1,259,814	4,366.5
7002	7,231,433	1,259,813	4,366.8
7003	7,231,439	1,259,826	4,366.2
7004	7,231,436	1,259,838	4,366.6

[a] The locations and elevations represent design coordinates. The final elevations will be recorded with the initial baseline survey.
ft = feet
msl = mean seal level

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-056, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 4: DPG-056 Post-Closure Inspection Schedule

Inspection / Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	Inspection Checklist (Appendix B of the Post-Closure Plan)	Semi-Annual
Salinity Testing	Inspection Checklist (Appendix B of the Post-Closure Plan)	Semi-Annual for two years
Settlement Monuments	Inspection Checklist (Appendix B of the Post-Closure Plan)	Annual/5 year intervals
Signs	Inspection Checklist (Appendix B of the Post-Closure Plan)	Semi-Annual
Drainage	Inspection Checklist (Appendix B of the Post-Closure Plan)	Semi-Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-056. Appendix B provides an inspection checklist.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-056 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-056.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monuments will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-056 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-056, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 hours of the event. A checklist is included in Appendix B. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the checklist included in Appendix B, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Appendix B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Mr. Scott Reed
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3592

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical after identifying the problem, or as directed by Dugway. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, the potential impacts, the proposed plan for action, and the time-frame in which corrective action will be implemented as required under this Permit. This plan shall be approved by the Executive Secretary prior to implementing corrective action.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final CMIR for DPG-056 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-056.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-056 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with UAC R315-3-3.1(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-056 shall be due no later than March 1, 2008. Specifically for DPG-056, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-056 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Executive Secretary may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Executive Secretary, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

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Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

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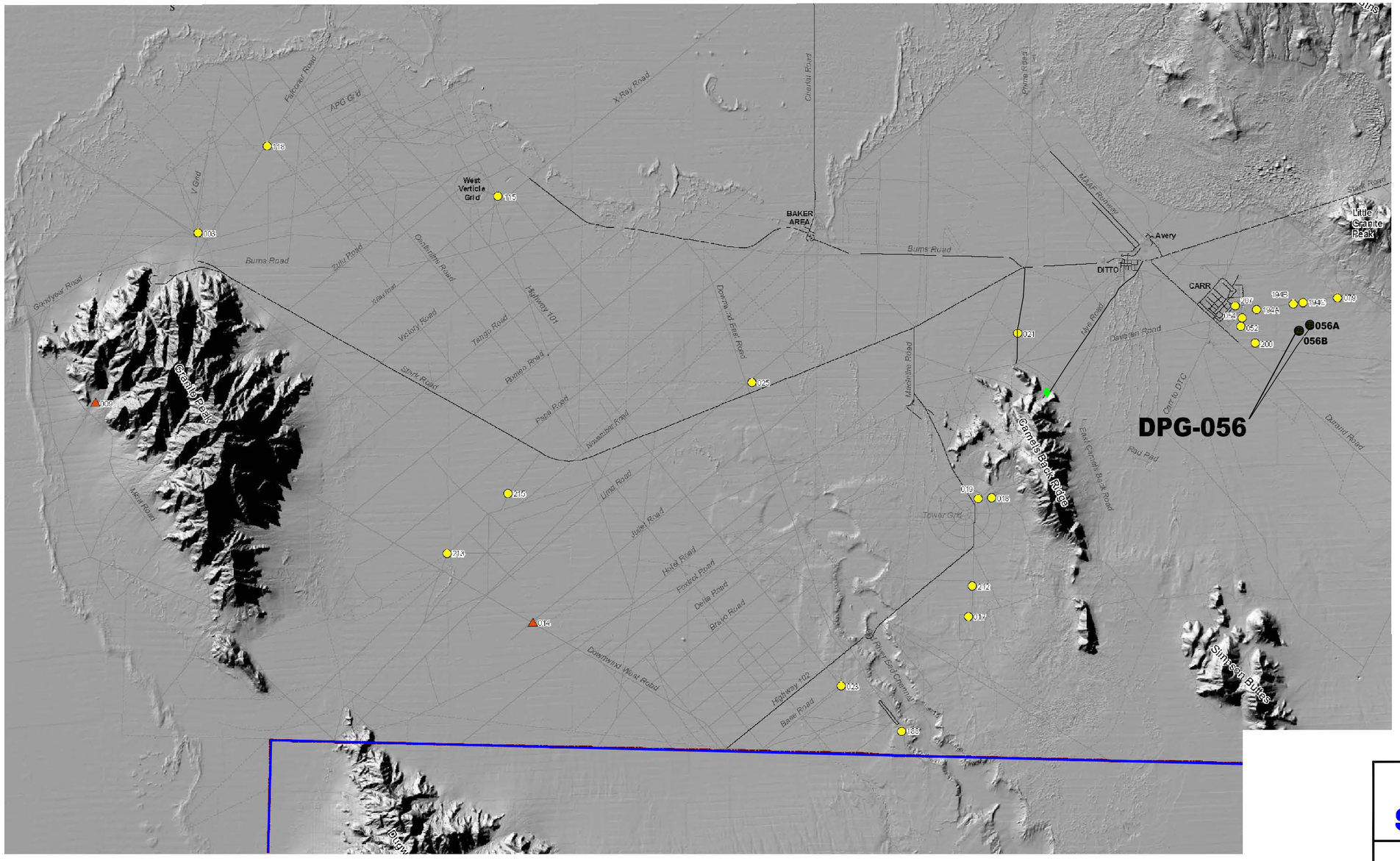
Shaw, 2006b. Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah, July.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway.*

FIGURES

IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
---	---	CONC	R. LANGSTON 2/22/2007	T. ERVIN 2/23/2007	M. AYALA 2/23/2007	119350-B245



Legend

- HWMU
- SWMU

DPG Roads

- paved
- runway
- gravel
- dirt
- two-track
- DPG boundary
- Nye Road Pit

N

SCALE IN FEET

12000 0 12000

Shaw Environmental, Inc.

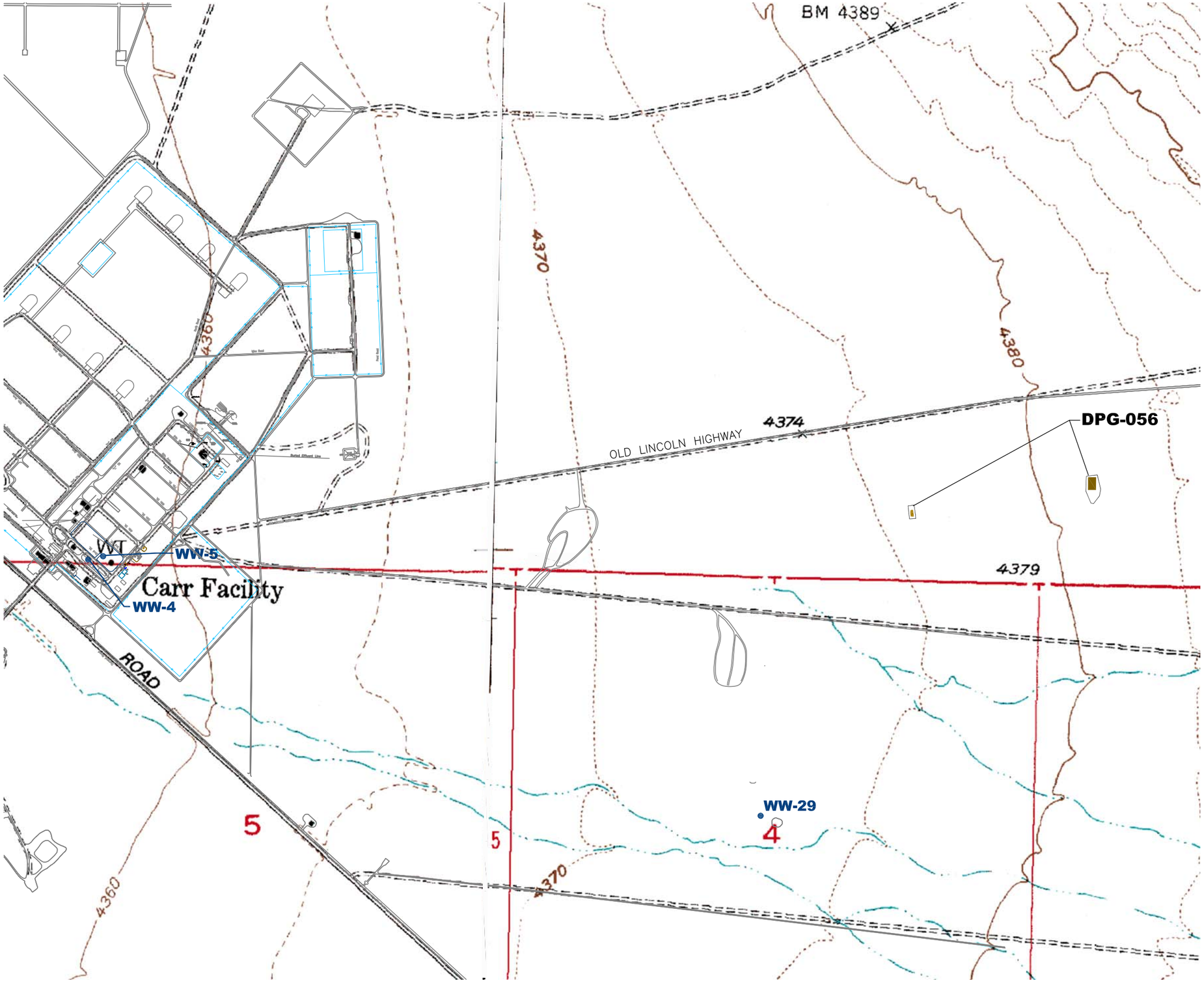
ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0002

FIGURE 1

DPG-056
LOCATION MAP

DUGWAY PROVING GROUND
DUGWAY, UTAH

IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
---	---	CONCORD	R. Langston 4/3/07	T. ERVIN 3/6/07	M. AYALA 3/6/07	870502-B257



LEGEND

- 4370 — Contour Line (5 Foot Intervals)
- Fence
- WW-4 — Water Supply Well
- DPG-056 Boundary

N

SCALE IN FEET

1000 0 1000

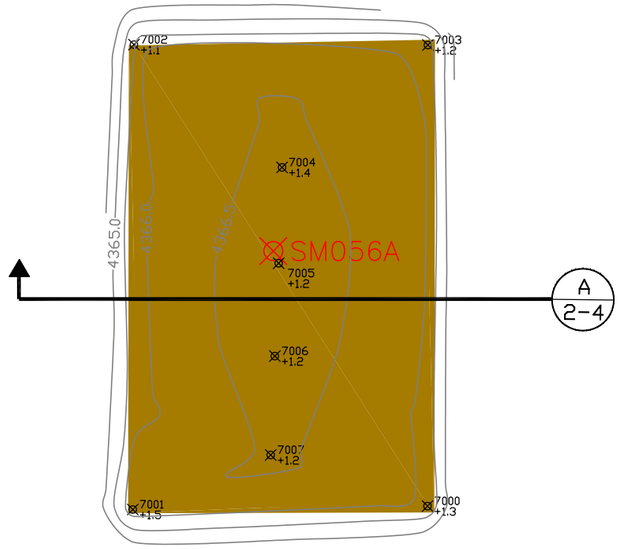
Shaw™ Shaw Environmental, Inc.

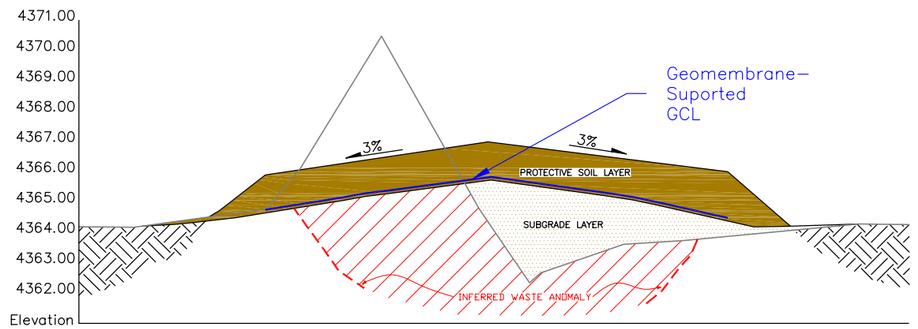
ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0002

FIGURE 2
DPG 056
REGIONAL TOPOGRAPHY
DUGWAY PROVING GROUND
DUGWAY, UTAH

FORMAT REVISION 2/26/99

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
---	DPG Roads	Concord	Sven S-L	12/01/2006	T. Ervin	0/06/2007	M. Ayala	0/06/2007	19350-B246





TYPICAL SECTION DPG-056A (A 2-4)

SCALE IN FEET

25 0 25

NOTE: Vertical scale exaggerated 5 times

FINAL-CONSTRUCTION TOPOGRAPHY

PRE-CONSTRUCTION TOPOGRAPHY

LEGEND

- SITE MONUMENT
- SURVEY MONUMENT
- ACCESS ROAD
- TOPOGRAPHY OF PROTECTIVE SOIL LAYER
- 7003 +1.2 VERIFICATION SHOT NUMBER THICKNESS OF SOIL LAYER AS PRESENTED IN TABLE 2-3

NOTES:

TOPOGRAPHIC CONTOURS WITHIN CAP BOUNDARIES REPRESENT THE TOP OF THE PROTECTIVE SOIL LAYER.

CONTOURS AT 0.5 FOOT INTERVAL

Prepared for:
U.S. Army Dugway Proving Ground
Topography by: Shaw Environmental
Date of Survey: 11/06/2006

N

SCALE IN FEET

40 0 40

Shaw Environmental, Inc.

ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0002

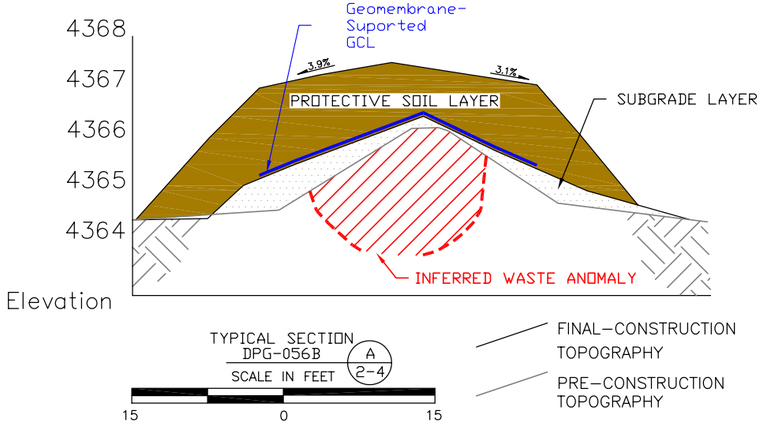
FIGURE 3A

DPG-056A
FINAL CONSTRUCTION TOPOGRAPHY

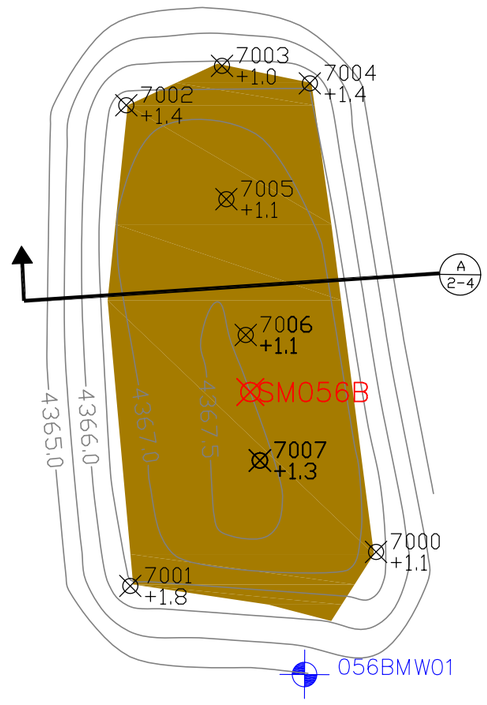
DUGWAY PROVING GROUND
DUGWAY, UTAH

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
---	---	Concord	Sven S-L	12/05/2006	T. Ervin	3/15/07	M. Ayala	3/15/07	19350-B247

DPG-056B



NOTE: Vertical scale exaggerated 5 times



LEGEND

- MONITORING WELL
- SITE MONUMENT
- SURVEY MONUMENT
- TOPOGRAPHY OF PROTECTIVE SOIL LAYER
- 7004 +1.4 VERIFICATION SHOT NUMBER THICKNESS OF SOIL LAYER AS PRESENTED IN TABLE 2-3

NOTES:

TOPOGRAPHY CONTOURS WITHIN CAP BOUNDARIES REPRESENT THE TOP OF THE PROTECTIVE SOIL LAYER.

CONTOURS AT 0.5 FOOT INTERVAL

Prepared for:
U.S. Army Dugway Proving Ground
Topography by: Shaw Environmental
Date of Survey:11/09/2006

N

SCALE IN FEET
20 0 20

Shaw Environmental, Inc.

ACSIM MARC
Contract Number: W91ZLK-05-D-0017
Task Order: 0002

FIGURE 3B

DPG-056B
FINAL CONSTRUCTION TOPOGRAPHY

DUGWAY PROVING GROUND
DUGWAY, UTAH

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

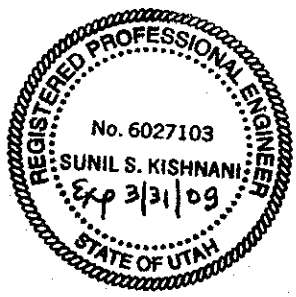
The Corrective Measures Implementation Report for DPG-056 (including DPG-056A and DPG-056B) at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-056 (including DPG-056A and DPG-056B). The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.



APPENDIX B

INSPECTION CHECKLIST

GENERAL SITE INSPECTION CHECKLIST
DPG-056 Disposal Sites East of the Carr Facility
Dugway Proving Ground, Utah
Post-Closure Plan

1. Purpose of Inspection:

   a. Routine ☐ (Annual, Semi-annual, etc.) circle one.

   b. Contingency ☐ (Storm Event, Fire, Earthquake, etc.) circle one.

   c. Other ☐ _____

2. Have inspectors completed training as required by permit condition VII.L?

   ☐ Yes
   ☐ No

Comments: _____

3. Did inspectors review the post-closure plan prior to the inspection?

   ☐ Yes
   ☐ No

Comments: _____

4. Are there open holes in the soil that may be caused by burrowing animals?

   ☐ Yes *
   ☐ No

** If yes, fill up the hole with clean soil and note the size of the hole on this form and the location on a map.*

Comments: _____

5. Are there noticeable depressions or ponding of surface water on the landfill cover?

   ☐ Yes *
   ☐ No

** If yes, backfill the depression with soil obtained from an approved borrow source. If signs of soil erosion are excessive (for example, cracks or rills greater than 2-inches wide and continual (recurring in the same area) corrective action may be necessary. Document significant cracks or rills that have the potential to impact the functionality of the cover system on the inspection form and attach a map showing the eroded area(s). Corrective action may include filling in the eroded or cracked area, investigation the*

cause of erosion, and regrading slopes. Corrective action may be needed (contact DPG Environmental Office immediately [same business day]).

Comments: _____

6. Are there large (more than 2 inches wide) cracks or rills in the soil cover?

☐ Yes *

☐ No

** If yes, notify the DPG Environmental Office immediately (same business day). Note the orientation, location, and frequency of cracks, determine whether the cracks are due to desiccation or slope failure, and photograph areas of concern, if possible.*

Comments: _____

7. Inspect the survey monument. Is it intact and legible?

☐ Yes

☐ No *

** If no, notify the DPG Environmental Office immediately (same business day) to determine the appropriate course of action for repair.*

Comments: _____

8. Inspect the survey monument. Is there evidence of erosion or subsidence in the vicinity of the monument (ponding, cracks, rills, or uneven terrain)?

☐ Yes *

☐ No

** If yes, notify the DPG Environmental Office immediately (same business day) to determine the appropriate course of action for repair and resurvey the settlement monument.*

Comments: _____

9. Is a survey required during this inspection event based on the time since the cover was installed or the answer to question 6 above?

☐ Yes *

☐ No

** If yes, resurvey the monument and note if the settlement monument position is significantly different in any direction from the coordinates in the following table:*

Survey Monument Coordinates

Description	Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument	SM056A	7,231,396	1,259,830	4,367.0
Survey Monument	SM056B	7,231,710	1,261,652	4,367.5

[a] *The location and elevation of the settlement monument is a design location. The final elevations will be recorded with the initial baseline survey.*

☐ Yes *

☐ No

** If yes, contact the DPG Environmental Office immediately (same business day) to arrange resurveying to establish magnitude of movement.*

Comments: _____

10. Was a soil sample collected for salinity testing (4-point composite)?

☐ Yes *

☐ No

** If yes, document the sampling activity, including collected sample form with GPS coordinates for the location of each sample aliquot.*

Comments: _____

11. Have any trees or shrubs grown on the landfill cover?

☐ Yes *

☐ No

** If yes, remove the tree(s) or shrub(s).*

Comments: _____

12. Are posted signs in place and in good condition (legible)?

☐ Yes

☐ No *

** If no, mark location(s) of damaged or missing signs and notify the DPG Environmental Office immediately (same business day) for repairs or replacements.*

Comments: _____

13. Inspect areas that channel water runoff at the site, including ditches and slope edges. Are there signs of excessive erosion (rutting 1-ft wide by 1-ft deep) from storm water runoff?

☐ Yes *

☐ No

** If yes, notify the DPG Environmental Office immediately (same business day) to determine the appropriate course of action for repair.*

Comments: _____

14. Inspect the two monitoring wells at DPG-056B. Is there any damage to the above-ground casing, cement apron, annulus, locks, or well caps?

☐ Yes *

☐ No

** If yes, notify the DPG Environmental Office immediately (same business day) to determine the appropriate course of action for repair.*

Comments: _____

15. Inspect the access road leading to the DPG-056 site. Are there significant potholes and/or erosion?

☐ Yes *

☐ No

** If yes, notify the DPG Environmental Office immediately (same business day) to determine the appropriate course of action for repair.*

Comments: _____

16. Were all parts of the landfill inspected as required in Section 6.0 of the post-closure plan?

☐ Yes

☐ No

Comments: _____

17. Were there any problems obtaining access to the site?

☐ Yes

☐ No

Comments: _____

18. Were any orphan wastes found inside or nearby the site?
How were the wastes managed? (contact DPG Environmental Office immediately [same business day]).

☐ Yes
☐ No

Comments: _____

Additional Notes (Time, temperature, wind direction, and other observations)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name of Inspector

_____

Company

_____ _____

Signature of Inspector Time and Date of Inspection